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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/812,717	03/29/2004	Francimar Schmitt	AMAT/8568/DSM/BCVD/JW	3736

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EXAMINER	
LAFOND, RONALD D	

ART UNIT	PAPER NUMBER
1709	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/812,717	SCHMITT ET AL.	
	Examiner	Art Unit	
	Ronald D. Lafond	1709	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *15-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The Amendments of July 18, 2007, have been received and were entered. Claim 7 is acknowledged as amended, and Claims 15 – 20 are acknowledged as cancelled. This action is in response to the amended Claims of this Application, of which Claims 1 – 14 are currently pending.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 7 – 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Regarding Claim 7, Applicants have amended this Claim to read: "A method for depositing a low dielectric film, comprising: delivering a gas mixture ***consisting essentially of***: a cyclic organosiloxane; and an oxidizing gas ***comprising*** N_2O to a substrate in a chamber ..." The recitation of an oxidizing gas comprising N_2O in an overall gas stream that has been limited by the transitional phrase 'consisting essentially of' reopens the claim language and thus makes the claim indefinite. Claims 8 and 11 – 14 depend from Claim 7, and are thus similarly rejected.

5. Regarding Claim 9, Applicants have amended this Claim to read: "The method of claim 7, wherein the gas mixture further comprises a linear hydrocarbon." Claim 9 as written seeks to broaden the limitations of Claim 7 by contradicting the transitional phrase 'consisting essentially of' by adding another compound to the gas mixture, thus rendering Claim 9 indefinite. Claim 10 depends from Claim 9 and is thus similarly rejected.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1 – 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li in view of Allman, et al (United States Patent 6,211,096).

9. Regarding Claims 1 and 2, Li teaches a method for depositing a low dielectric constant film comprising: a) delivering a gas mixture comprising: I) a cyclic organosiloxane; and II) two or more oxidizing gases comprising N_2O and O_2 to a substrate in a chamber; and b) applying RF power to the gas mixture at conditions sufficient to deposit a low dielectric constant film on a surface of the substrate (see Paragraphs [0015], [0016], [0053], [0056], and [0057], and Claim 1).

However, Li does not teach that the ratio of a flow rate of the N_2O to a total flow of the two or more oxidizing gases into the chamber is between about 0.1 and about 0.5. Allman teaches just such a limitation, wherein, in a plasma-enhanced chemical vapor deposition (PE-CVD) process, adjusting the relative amounts of N_2O or O_2 used in an oxidizing gas stream consisting of only N_2O and O_2 can allow the user to tune the dielectric constant of the oxide film produced (see Summary of the Invention, Column 2, lines 48-67 of Allman). In one embodiment, Allman teaches a flow rate of 2 l/min for N_2O and 6 l/min for

O_2, for a ratio of the flow rate of the N_2O to the total flow of the oxidizing gases into the chamber of 0.25 (see Column 7, lines 6-8 of Allman), which falls within the range claimed by Applicants. As it states in the Abstract of Allman, "By controlling the ratio of nitrogen to oxygen in the source gas as used in the CVD method, the ultimate nitrogen, carbon ... concentrations in the film can be controlled and hence the dielectric constant of the film produced." Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Li by using an oxidizing gas composition as described in Allman to have further tuned the dielectric constant of the film being produced via the PE-CVD process disclosed in Li with a reasonable expectation of success.

10. Regarding Claims 3 – 5, Li teaches that the cyclic organosiloxane is OMCTS (see Paragraph [0019] of Li). Li also teaches that the gas mixture further comprises an inert gas selected from the group consisting of helium, argon, and combinations thereof (see Paragraph [0077] of Li).

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li and Allman as applied to Claim 1 above, and further in view of Ross, et al (United States Patent 6,582,777).

12. Li and Allman do not teach the method further comprising post-treating the low dielectric constant film with an electron beam. Ross teaches just such a limitation (see Summary of the Invention of Ross, Column 3, lines 55 – 60, "The invention also provides a process for forming a dielectric layer on a substrate which comprises chemical vapor depositing a dielectric layer on a substrate and then exposing the chemical vapor deposited dielectric layer to electron beam radiation for a sufficient time, temperature, electron beam energy and electron beam dose to reduce the dielectric constant of the layer.") Because the aim of the current application is to deposit a low dielectric constant film via CVD, it would have been obvious to one having ordinary skill in the art at the time of the present invention to have modified the method taught by Li in view of Allman by using the e-beam treatment taught by Ross to have further reduced the dielectric constant of the low dielectric constant film with a reasonable expectation of success.

13. Claims 7 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li. Regarding Claims 7 and 8, Li teaches a method for depositing a low dielectric constant film, comprising: a) delivering a gas mixture consisting essentially of : I) a cyclic organosiloxane; and II) an oxidizing gas comprising

N_2O to a substrate in a chamber; and b) applying RF power to the gas mixture at conditions sufficient to deposit a low dielectric constant film on a surface of the substrate (see Paragraphs [0015], [0016], [0053], [0056], and [0057], and Claim 1).

However, Li does not explicitly teach this method wherein the N_2O is delivered into the chamber at a flow rate between about 0.71 sccm/cm^2 and about 1.42 sccm/cm^2 of substrate surface. Li also teaches that "the oxygen containing gas has a flow rate between about 100 and about 6,000 sccm" (see Paragraph [0061]). Li describes this process for a 200 mm substrate (see Paragraph [0084]), which has a surface area of about 300 cm^2, assuming a circular substrate with a 200 mm diameter; this corresponds to a flow rate of between about 0.32 and about 19 sccm/cm^2, which completely encompasses and thus anticipates the range of about 0.71 sccm/cm^2 to about 1.42 sccm/cm^2 of claim 7. ("In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Circ. 1990)" See MPEP 2144.05). Therefore, it would have been obvious to one having ordinary skill in the art to have chosen a flow rate from within the disclosed operative range, such as 0.71 – 1.42 sccm/cm^2, with a reasonable expectation of success because Li teaches that such conditions are suitable for deposition.

14. Regarding Claims 9 and 10, Li teaches the method of Claim 7, wherein the gas mixture further comprises a linear hydrocarbon, and wherein the linear hydrocarbon is ethylene (With regard to linear hydrocarbons, see Paragraph [0052] of Li: "The aliphatic compounds also include aliphatic hydrocarbon compounds ..." Li teaches that the linear hydrocarbon is ethylene (see Paragraph [0052] of Li, "For example, the organic compounds may include alkenes, such as ethylene.") Li also teaches, as in Claims 11 and 12, that the cyclic organosiloxane is OMCTS (see Paragraph [0019] of Li). Finally, Li also teaches, as in Claim 13, that the gas mixture further comprises an inert gas selected from the group consisting of helium, argon, and combinations thereof (see Paragraph [0077] of Li).

15. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li as applied to Claim 7 above, and further in view of Ross, for substantially the same reasons applied to Claim 6 above.

Double Patenting

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. Claims 1 – 5 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 9, and 13 – 14 of U.S. Patent No. 6,797,643, and further in view of Allman, for substantially the same reasons given for Claims 1 – 5 above.

18. Claim 6 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,797,643 in view of Allman, and further in view of Ross, for substantially the same reasons given above regarding Claim 6.

19. Claims 7 – 13 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 9, and 13 – 14 of U.S. Patent No. 6,797,643, and further in view of Li. Claims 7 and 8 of the present application read directly on Claim 1 of the '643 patent, although Claim 1 of the '643 patent does not require that the oxidizing gas comprising or consisting of N_2O be delivered into the chamber at a flow rate of between about 0.71 and 1.42 sccm/cm^2. However, Li discloses just such a limitation, as described above. Therefore, it would have been obvious to one having ordinary skill in the art at the time this application was filed to have used the N_2O flow rates disclosed in Li in the film deposition process disclosed in the '643 patent with a reasonable expectation of success, because Li teaches that such conditions are suitable for deposition (see Paragraph [0061] of Li, and Paragraph 16 in this Action for further analysis). Claims 9 and 10 of the present application read directly on Claim 14 of the '643 patent, and further in view of Li. Claims 11 and 12 of the present application read directly on

Claims 9 and 13 of the '643 patent, and further in view of Li. Claim 13 of the present application reads directly on Claim 1 of the '643 patent, and further in view of Li, wherein the gas mixture further comprises an inert gas selected from the group consisting of helium, argon, and mixtures thereof, as disclosed in the Specification of the '643 patent in Column 9, lines 14 – 22.

20. Finally, Claim 14 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,797,643 in view of Li, and further in view of Ross, for substantially the same reasons given above regarding Claim 6.

Response to Arguments

21. Applicants' arguments filed on July 18, 2007, have been fully considered but they are not persuasive.

22. Due to the amendment of Claim 7, the rejections to Claims 7 – 14 under 35 U.S.C. 112, Second Paragraph are hereby withdrawn.

23. Because Claims 15 – 20 were withdrawn by Applicants, the rejections to Claims 15 – 20 under 35 U.S.C. 102 are hereby withdrawn.

24. In Applicants' Remarks C, Applicants argue essentially that there is no motivation to combine Li and Allman. This argument is not persuasive. In response to Applicants' argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Allman clearly teaches that by varying the ratio of N_2O to O_2 in the oxidizing gas stream, low dielectric constant films may have their dielectric constants further reduced due to the increased inclusion of nitrogen and other dopants (see Column 4, lines 32 – 50, and Column 5, lines 2 – 4). Furthermore, although the example cited in the previous Office Action indeed refers to a higher dielectric constant film, this property is due primarily to the inclusion of a high dielectric constant compound in the film produced

(titanium isopropoxide; see Column 6, lines 55 – 67, and Column 7, lines 1 – 11), and not due to the relative ratio of oxidant gases used. In the absence of unexpected results which are not present (Applicants' examples teach that the ratio of oxidant gases is almost immaterial to the production of low dielectric constant films, see e.g. Examples 1 – 3 and Comparison Examples 1 – 3), the fact that Allman teaches the method of varying the proportions of oxidizing gases to help "tune" the dielectric constant of films produced by the plasma deposition of organosiloxane films would be sufficient motivation to allow one having ordinary skill in the art to conclude that it would have been obvious to combine the teachings of Li and Allman with a reasonable expectation of success.

25. In Applicants' Remarks D, Applicants argue that the amendment of Claim 7 to replace the transitional phrase 'comprising' with the transitional phrase 'consisting essentially of' in the recitation of gas components claimed results in a non-obvious difference between Claims 7 – 14 and Li. This argument is not persuasive. See MPEP 2111.03 : "The transitional phrase 'consisting essentially of' limits the scope of a claim to the specified materials or steps 'and those that do not materially affect the basic and novel characteristic(s)' of the claimed invention. *In re Herz*, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976) ... For the purposes of searching for and applying prior art under 35 U.S.C. 102 and 103, absent a clear indication in the specification or claims of what the basic and novel characteristics actually are, 'consisting essentially of' will be construed as equivalent to 'comprising.' See, e.g., *PPG*, 156 F.3d at 1355, 48 USPQ2d at 1355 ... If an applicant contends that additional steps or materials in the prior art are excluded by the recitation of 'consisting essentially of,' applicant has the burden of showing that the introduction of additional steps or components would materially change the characteristics of Applicants' invention. *In re De Lajarte*, 337 F.2d 870, 143 USPQ 256 (CCPA 1964)." In the absence of unexpected results which again are not disclosed by the Application (see especially Example 4 versus Examples 6 and 7, in which a lower dielectric constant film is produced due to the inclusion of ethylene in the gas mixture used), the use of the transitional phrase 'consisting essentially of' does not further limit Claim 7, and thus Claim 7 and its dependent Claims are rejected as in the previous Office Action.

26. In Applicants' Double Patenting response to the rejections made in the previous Office Action, Applicants have withdrawn Claims 15 – 20 and have agreed to file a Terminal Disclaimer to obviate the

rejections of Claims 1 – 14 due to obviousness-type double patenting. However, with the Terminal Disclaimer having not been filed, the previous rejections still stand.

Conclusion

27. Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ronald D. Lafond whose telephone number is (571) 270-1878. The examiner can normally be reached on M-F 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RDL

MICHAEL B. CLEVELAND
SUPERVISORY PATENT EXAMINER